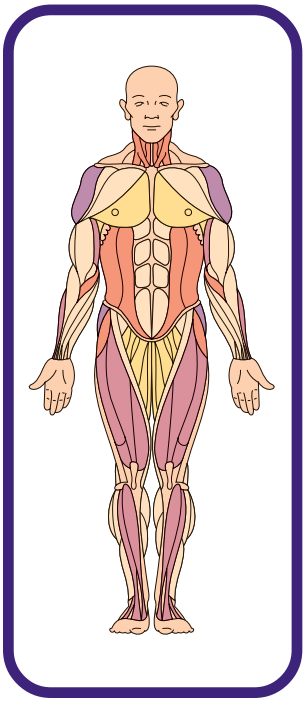
Human Requirements Reading



Humans have a few basic needs for survival. These include energy sources (food, plants, the Sun), nutrients, water, oxygen and a moderate **temperature**. Humans also need protection from poisonous gases and high levels of **radiation**.

Food gives us energy. When we eat food, some components of food are broken down into sugar for energy. Our bodies use the sugar to make the energy we need to move and grow. Energy allows all of our organs to function, allows us to move, talk, run, think, breathe and do all of the things we do every moment. Food for humans is like electricity for a computer. Without electricity, a computer cannot do anything. Without energy, our bodies cannot do anything.

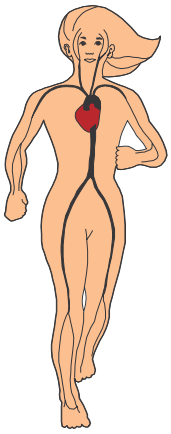
We cannot gain our energy directly from the Sun, so we have to eat plants that gather their energy from the Sun. Animals also gain their energy from plants, so we can also gather energy by eating animals. Therefore, humans need plants and the Sun's energy to survive.

Nutrients from food build and mend our bones, teeth, nails, skin, hair, flesh and organs and allow us to grow. We need to have a well-balanced diet in order to have all of the nutrients that our body needs.

We can't get energy from sugar without oxygen. When we breathe oxygen, it is carried throughout our body in the bloodstream to all parts of the body and into the cells where energy is made.

Humans need an average of two quarts of water a day. Our bodies are 60-70 percent water. Water is in our blood, our cells, our tissues and body fluids. Water allows nutrients to circulate throughout the body and allows the body to filter out waste and poisons. Water also allows the body to regulate its temperature. Without water our bodies become dehydrated, which means they lose water. If you have ever run for a long time on a very hot day and became very thirsty, you might have been experiencing a little dehydration. Dehydration can become much worse. For example, sometimes when people have the flu, they can become dehydrated and have to go to the hospital. Humans can survive only about three days without water.

Humans cannot survive very cold or very hot temperatures. Humans must maintain an average body temperature of 98.6° Fahrenheit/37° Celsius. When our body temperature goes above this, we sweat to cool ourselves down. When our body temperature goes below this, we shiver to generate heat. However, our body cannot correct for very large temperature changes. If we are exposed to very cold temperatures, our bodies lose their heat, and we can die from **hypothermia**. If we are exposed to very hot temperatures, we can die from heat stroke.

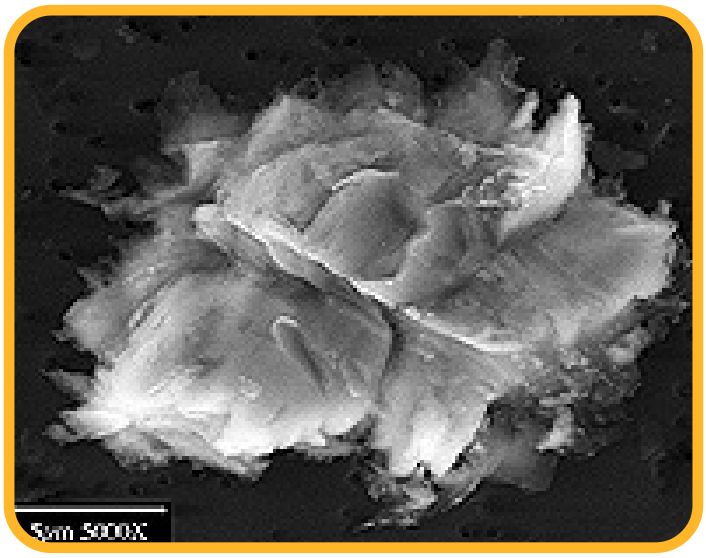


Humans must also be protected from harmful gases and too much radiation. An atmosphere with poisonous gases would kill us. Likewise, we need protection from high levels of radiation that come from the Sun and from exploding stars. We especially need protection from **solar flares**, because they can be unpredictable and release a lot of radiation. High levels of radiation break down the tissues in plants and animals, causing cancer and eventually death.

Although humans can survive for a short time in microgravity, the effects of microgravity on our bodies have led scientists to conclude that gravity is important for normal development and function. Without gravity, our bones and muscles shrink and become weak. We lose bodily fluids and red blood cells needed to deliver oxygen and remove waste throughout the body. Fluids in our ears float, so that we become disoriented and confused, and we experience motion sickness. We do not know the range of gravity that is needed for our bodies to function normally, but too much gravity would also have negative effects on our bodies.

It is interesting to note that some living things can exist with different requirements than humans. There are **microbes** that can live in extremely cold or extremely hot environments, can obtain their energy from volcanic vents rather than from the Sun or other living things and are able to bear higher levels of ultraviolet radiation than humans.

If we have all of the essential things described in this reading, our bodies can function normally; however, some scientists would argue that this would not be enough. They point out that humans have psychological needs, too. Humans need interaction with other humans, for example. A big problem for astronauts who spent a lot of time on the Mir Space Station was that they missed their families a lot. There are scientists whose entire job is just to design the International Space Station so that it is a pleasant environment for scientists. They look at how to design the structure, select colors that are pleasing and to include plants to make the environment more comfortable for astronauts.



Exotic-looking microbe found in Antarctic ice.

Questions

(Answer on a separate sheet of paper)

1. What are three things humans need?
2. Where does our energy come from?
3. Why do we need oxygen?
4. What would happen to our bodies without water?
5. Why is the temperature of Earth important to human survival?
6. Do all living things need the same things as humans? Explain.